

Radiation Resistant Hybrid Lotus Effect Photoelectrocatalytic Self-Cleaning Anti-Contamination Coatings, Phase I

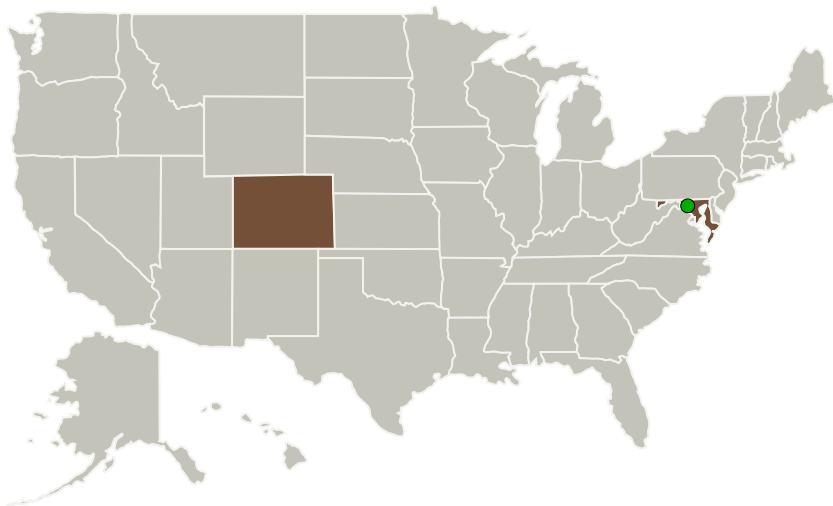
Completed Technology Project (2010 - 2010)



Project Introduction

This project will develop radiation resistant hybrid Lotus Effect photoelectrocatalytic self-cleaning anti-contamination coatings for application to Lunar Operations. The coatings will be demonstrated to operate in galactic cosmic ray (GCR) and solar event proton (SEP) environments. The coatings will have low surface energy to significantly reduce Van der Waals forces (superhydrophobicity), which also reduce contaminant adhesion and will integrate a biocide stoichiometric and photoelectrocatalytic component which has been successfully demonstrated against a range of biological pathogens and toxic chemicals. The Lotus-effect sheds particles, such as dust and spores, by reducing the surface energy and the amount of surface area needed for attachment by utilizing a nano-textured structure to achieve its anti-contamination and self-cleaning properties thereby minimizing contaminant accumulation on surfaces. Dust mitigation coatings on various surfaces will be developed for > 99% removal of initial dust contaminant compared to conventional materials, without damage to the surface being cleaned. The coatings utilize a unique approach for biocide and chemical neutralization and will simplify decontamination procedures by neutralizing microorganisms or harmful chemicals on surfaces of structures and equipment in low gravity, as well as in extraterrestrial environments, preventing potential catastrophic contamination.

Primary U.S. Work Locations and Key Partners



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Table of Contents

| | |
|--|---|
| Project Introduction | 1 |
| Primary U.S. Work Locations and Key Partners | 1 |
| Project Transitions | 2 |
| Organizational Responsibility | 2 |
| Project Management | 2 |
| Technology Maturity (TRL) | 2 |
| Technology Areas | 3 |
| Target Destinations | 3 |

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| Organizations Performing Work | Role | Type | Location |
|-------------------------------------|-------------------------|-------------|--------------------------|
| International Photonics Consultants | Lead Organization | Industry | Pagosa Springs, Colorado |
| ● Goddard Space Flight Center(GSFC) | Supporting Organization | NASA Center | Greenbelt, Maryland |

| Primary U.S. Work Locations | |
|-----------------------------|----------|
| Colorado | Maryland |

Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139366>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

International Photonics Consultants

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

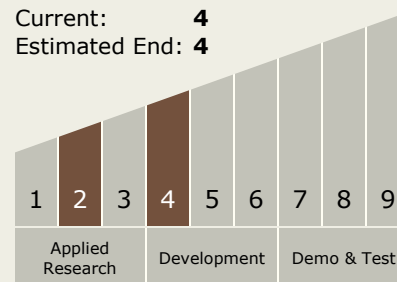
Edward W Taylor

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.5 Particulate Contamination Prevention and Mitigation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System